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RESEARCH IN PROFESSIONAL EDUCATION, WITH SPECIAL REFERENCE TO MEDICAL EDUCATION. NEW DIMENSIONS IN HIGHER EDUCATION, NUMBER 22.

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THE GROWTH OF RESEARCH IN MEDICAL EDUCATION WAS REVIEWED AS AN OUTSTANDING EXAMPLE OF RESEARCH IN PROFESSIONAL EDUCATION. SUCCESSIVE DEVELOPMENTS IN RESEARCH IN MEDICAL EDUCATION ARE DESCRIBED IN RELATION TO THE PATTERN OF ACCELERATING CHANGE THAT FOLLOWED WORLD WAR II. THE AUTHOR REPORTS THAT THE CHANGES IN CURRICULUM INTRODUCED IN SOME SCHOOLS AND THE RESEARCH PROGRAMS THAT WERE INITIATED TO EVALUATE THOSE PROGRAMS PROVIDED THE STIMULUS FOR OTHER CHANGE-PRODUCING ACTIVITIES SUCH AS ANNUAL INSTITUTES ON TEACHING AND ADMINISTRATION SPONSORED BY THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES AND THE DISSEMINATION OF THEIR REPORTS WHICH SURVEYED THE ENTIRE FIELD OF MEDICAL EDUCATION. RECOGNITION OF THE IMPORTANCE OF PROMOTING AND STIMULATING RESEARCH IN MEDICAL EDUCATION LED TO THE ESTABLISHMENT OF THE DIVISION OF EDUCATION. THE DIVISION'S PROGRAM OF RESEARCH AND DEVELOPMENT OF CONCEPTUAL MODELS FOR RESEARCH HAS INCLUDED THE STUDY OF INDEXES AND CORRELATES OF EDUCATIONAL EFFECTIVENESS AND THE CLARIFICATION OF CRITERIA OF PROFESSIONAL PERFORMANCE AS THE ULTIMATE CRITERIA OF MEDICAL EDUCATION. THE DIVISION OF OPERATIONAL STUDIES WAS ESTABLISHED TO COMPILE INFORMATION RELATED TO FACULTY AND TO THE FINANCING OF MEDICAL EDUCATION. SEPARATE SECTIONS OF THIS REVIEW OF LITERATURE PRESENT REPORTS ON STUDIES OF STUDENT CHARACTERISTICS, THE TEACHING-LEARNING PROCESS, PERFORMANCE OF THE GRADUATE PHYSICIAN, GRADUATE AND CONTINUING MEDICAL EDUCATION, AND NURSING AND DENTISTRY. IN ADDITION, AN OVERVIEW IS PRESENTED THAT SUMMARIZES THE ROLE OF PROFESSIONAL ORGANIZATIONS IN EDUCATIONAL RESEARCH, THE TRENDS IN RESEARCH STUDIES, AND A LIST OF QUESTIONS CONCERNING PROFESSIONAL EDUCATION THAT ARE RELEVANT TO ALL AREAS OF PROFESSIONAL EDUCATION. (AL)

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With Special Reference to Medical Education

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NEW DIMENSIONS
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RESEARCH IN PROFESSIONAL EDUCATION

With Special Reference to Medical Education

by Milton J. Horowitz

Everett H. Hopkins, Editor

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

JOHN GARDNER, Secretary
Office of Education
HAROLD HOWE II, Commissioner

ABOUT THE AUTHOR

Milton J. Horowitz was graduated from the College of the City of New York in 1943 and then served in the army for several years as a translator of Japanese. He completed the Clinical Psychology Training Program at the Menninger Foundation, Topeka, Kansas, in 1950, and was awarded the Ph. D. degree in psychology from the University of Kansas in 1952.

Beginning in 1952, Dr. Horowitz held joint appointments in the Department of Psychiatry, School of Medicine, Western Reserve University and on the staff of the University Hospitals of Cleveland where he served as Chief Psychologist from 1956-1964. He played a major role in studies of the revised program of medical education at Western Reserve University and in 1958 he helped establish its Division of Research in Medical Education. In 1961-1962 he spent a sabbatical year at the Center for the Study of Higher Education, University of California at Berkeley, where he participated in the work at that Center and prepared his book Educating Tomorrow's Doctors. Dr. Horowitz has had a continuing interest in research in higher education, particularly in studies of student development. He has maintained a clinician's orientation in examining the educational process.

In 1964, he joined the staff of the Reiss-Davis Child Study Center as Associate Director, Professional Services. In his current position, Dr. Horowitz is responsible for coordinating and developing training programs in child psychiatry, clinical child psychology and psychiatric social work, and participates in community education programs for teachers and pediatricians. He is also active in the diagnostic, therapeutic, and research activities at the Reiss-Davis Center.

Dr. Horowitz's publications reflect his varied interests as clinician, teacher, and investigator. The preparation of persons in the professions is a topic he believes especially well suited to accommodating simultaneously his several professional interests.

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FOREWORD

(If and when this manuscript is published for general distribution, the Editor will gladly prepare an appropriate Foreword for the wider audience.)

HIGHLIGHTS

1. Research in professional education is growing rapidly in quantity and steadily in quality. It is being pursued vigorously in a number of professions and on a great variety of topics.

2. Research in medical education has shown particular vitality and growth in the last 20 years. More is known about students, the curriculum, the teacher and the teaching-learning process in medical education than about any other field of professional education. Of special interest in research in medical education are: (a) the innovations and changes in curriculum and the attempts at their evaluation; (b) the collaborative studies among schools and between schools and extramural organizations; (c) the stimulating and productive role of the Association of American Medical Colleges; (d) the establishment of Divisions of Research in Medical Education in individual schools; and (e) the interdisciplinary orientation and collaboration, including the work of psychologists and sociologists in the earlier phases of the research, and educationists in more recent years.

3. The range of subjects for research is steadily widening--beginning with emphasis on selection and prediction of success in students and attempts at evaluating student development, describing the teaching-learning process, and characterizing the performance of graduates. Medicine's growing commitment to improving the graduate education of physicians is likely to have a salutary effect not only on improving the quality of medical care, but also in understanding the nature of the total educational process and improving the methods for reviewing the performance of the practitioner. All professions are concerned with the work of their practitioners.

4. Medical researchers are also concerned with the establishment of new organizational structures to lay the groundwork for the further developments in preparing physicians for research in education and in sharing personnel and facilities for educational research among schools of medicine, nursing, and dentistry.

5. Research in teaching methods -- the techniques and materials of instruction -- is growing more rapidly than perhaps any other area in all fields of professional education. Simultaneously, efforts are being directed at studies of learning by the student, including methods of self-instruction, the use of programmed learning and technical innovations such as television. The professions also appear quite willing to examine the teacher in the investigation of the teaching-learning process.

6. Significant questions for educational research may be identified as common to all professional schools despite other differences. Included prominently among such questions are those related to basic problems in educational research: (a) defining program objectives in sufficient detail so that they are clear; (b) devising adequate and appropriate methods of evaluation to determine whether the objectives are realized; (c) devising a curriculum that is appropriate to program objectives; and (d) accommodating the curriculum and methods of evaluation to individual differences in students.

7. Three current needs in research in professional education are: (a) to relate what occurs in research programs in individual schools to the larger interests of the profession and other professions; (b) to establish models for inter-school cooperation as well as cooperation between professional schools and extra-mural organizations; and (c) to develop appropriate guiding concepts to conceptualize the findings available from research already conducted.

I. INTRODUCTION: RESEARCH IN PROFESSIONAL EDUCATION*

Research in education for the professions is a relatively recent development in the history of education. Though there has been much debate as to the nature of the professions[1, 2, 5] and perhaps even more controversy within professions as to what constitutes adequate preparation for activity within them, there has been no debate as to what constitutes research in professional education. Nor has there been disagreement that such research is necessary. Quite the contrary: leaders in the professions widely recognize the need for educational research as well as curriculum change.

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* It is a pleasure to thank those who have contributed to the preparation of this monograph. Stephen Abrahamson (Office of Research in Medical Education, University of Southern California School of Medicine), Samuel W. Bloom (Downstate Medical Center, State University of New York), Ann Heiss and Paul A. Heist (Center for Research and Development in Higher Education, University of California, Berkeley), and Paul J. Sanazaro (Division of Education, Association of American Medical Colleges) offered suggestions for bibliography and helped improve the accuracy and quality of the manuscript. I am, of course, responsible for the final product.

Barbara Tate (National League for Nursing) and Dorothy Gregg (Frances Payne Bolton School of Nursing, Western Reserve University) suggested certain references in nursing education research. Charles R. Jerge (University of Connecticut School of Dental Medicine), Richard S. Mackenzie (University of Pittsburgh School of Dentistry), and Dale E. Mattson (American Association of Dental Schools) provided help with references to research in dental education. It has been necessary to be selective in the use of references; many valuable contributions, particularly in nursing and dental education research, have been omitted or overlooked.

I am grateful to Dr. Rocco L. Motto, Director, Reiss-Davis Child Study Center, for his encouragement and support throughout this project.

Sonia Richardson typed the manuscript and ably managed the organization of references and other details.

One of the fields of professional education in which major developments have taken place in curriculum revision and research is medical education. After World War II, medical schools introduced innovations in curriculum and launched investigations in a variety of areas related broadly to evaluating the processes and outcomes of learning. The magnitude and scope of these efforts are without parallel in other fields of professional education.

We have chosen to review the developments in medical education in some detail rather than attempt to cover trends in all fields of professional education. Knowledge of the characteristics of students, teachers, and of the teaching-learning process has reached a more advanced state in the context of medical education than in any other field of professional education. There are varied and interesting organizational models for the conduct of research in medical education, including investigative programs within schools, cooperative ventures among schools, collaboration between schools and extramural organizations, and studies done exclusively by outside agencies. As this field of inquiry gains maturity, the changing emphases in research are also worthy of study. In a word, the advances in research in professional education may be best illustrated by examining what is going on in medical education.

Important strides are also being made in the growth of other professions and in research dealing with their educational programs.[3, 4] We shall comment briefly on developments in educational research in two other health professions: nursing and dentistry. Certainly, research in nursing education has shown significant growth, and more recently there have been signs of the awakening of interest in research in dental education. It is not possible, however, within the limits proposed for this monograph, to examine fully the developments in educational research in these two areas. The limited references to these fields have been selected to give the reader an introduction to the varieties of studies in both disciplines. And, though brief, the material selected will be adequate to suggest where the recurring research emphases appear to extend across the several health professions.

It is the purpose of this monograph to identify trends and developments in the areas reviewed. Discussion and further details may be found in the references, which are grouped to accompany the principal sections of the text. Obviously, many studies and reports will have relevance for more than one section; overlapping of content across sections is unavoidable.

Annotated references represent contributions that should be given priority by readers who are unacquainted with the field, although the other references are to contributions also deserving of attention. Included are publications which, while they are not research reports, have implications for research in professional education.

II. CURRICULUM DEVELOPMENT, INNOVATION, AND INSTITUTIONAL SELF-STUDY

Since the turn of the century, medical education has been characterized by change and continuing advance. As Coggeshall has noted, the "renaissance in medical education" following the publication of the Flexner report in 1910[18] was followed by many changes and advances during the next 30 years.[43] But it was not until the end of World War II that noteworthy changes began to occur in medical education. Individual schools began to redefine objectives and to modify curriculums. Efforts were made to examine the effects of these changes on students, on faculty, on the teaching-learning process, and on the products of the schools. The most dramatic and extensive of these experiments, introduced at the Western Reserve University School of Medicine beginning in 1952 after a period of some six years in planning, has been summarized by Ham.[114, 115]

The forces operating to influence the development of new educational programs have been examined by many leaders in medical education including Darley,[13] Wearn,[24] and Berry.[7] Coggeshall, in evaluating the substantive changes in medical education in the last 20 years, notes three principal factors: medical education increased in complexity; patient care had become a major medical school responsibility; and research had grown dramatically in relative importance as well as in volume.[43, p. 9] Lee has identified three forces significant in providing the impetus for the innovations during this period: the impact of the information explosion; the emergence of medical education as a university responsibility; and the accordance to the patient of a central role in medical education.[21] In an earlier monograph, Lee reviews and analyzes the changes introduced at nine schools.[20] In both publications, Lee provides a conceptual base for the examination of specific curriculum changes. The contributions by Lee and Coggeshall, it should be remarked, represent excellent overviews of the changes that occurred.

Because a number of schools introduced some change in curriculum at approximately the same time, it may have appeared that changes were being wrought on a broad front. Perhaps half of the 77 medical schools in existence in 1945 have changed their programs in some way in the last 20 years. Western Reserve, however, was the only school to introduce a major schoolwide experiment in curriculum. A few other schools modified one or another part of the total program. Relatively minor changes, such as shifting hours or teaching sequences, were quite common. Undergraduate medical education, however, did not experience a wholesale overhauling. Rather, it was that faculties in a number of schools became highly involved in attempts to define and redefine objectives, to examine their efforts critically, and to consider experiments with curriculum. Lee caught the spirit of the decade of the fifties in medical education by describing it as "a period of unprecedented self-scrutiny."[20, p. 46]

Furthermore, the changes introduced in the fifties were not of the order of rigorous experiments as hoped for by Dietrick and Berson who observed in 1953:

> Little or no evidence is to be found throughout the country of real experiments in medical education, even though experimentation and research are part of the armamentarium of medicine. Even when circumstances bring about a situation that would permit of a real experiment, with ready-made controls, the experiment is not carried out . . . the faculty should ask itself how effective a new program or a change in the curriculum really is. There is a real need for such experiments in medical education and in the study and testing of teaching methods. Too much reliance is placed on tradition and authority.[15, p. 323-24]

Certainly the readiness to change was not new in the history of medical education. But a new readiness was apparent. Coincident with the introduction of curriculum changes, medical schools turned to the task of evaluating the effects of these changes. It was at this point that research in medical education may be said to have started. Abrahamson reminds us that it was not until medical schools began to introduce changes in program and to examine their effects, that there was any move in medical education toward developing what educators might describe as research in curriculum development.[6]

In a technical sense, therefore, research associated with curriculum revision might be considered under the heading of curriculum development, as it is here; and as curriculum revision is carried out and investigated in individual schools, it is sometimes referred to in higher education research as institutional self-study. As we shall later describe, institutional self-study has taken on interesting structures and functions in medical schools.

The efforts by schools to study their educational programs began in early evaluation studies at three medical schools: Colorado,[19] Cornell,[91, 93] where interest centered on evaluating the effects of a change in one part of the curriculum, and at Western Reserve, where the problem for evaluation concerned assessing the effects of a major schoolwide curriculum change on the four-year experiences of students.[112] Medical educators invited investigators from other fields to join with them in assessing the effects on medical students of changes in program. Bloom provides a fascinating account of how the work by sociologists in this area opened a field of inquiry that has since become known as the sociology of medical education, a major development in contemporary sociology.[85] Similarly, the contributions of psychologists in the study of personality and other characteristics of medical students, and, more recently, the work of educationists in divisions of educational research in medical schools attest to the continuing growth of multidisciplinary research approaches converging on the tasks of evaluating the impacts of educational environments on students.

The climate of change in this unusual period of self-examination was reflected in ways beyond the modification of curriculum at individual schools. The Association of American Medical Colleges, for example, as described in the next section, initiated a series of studies and institutes and exercised the leadership necessary to support the growing interest in change and in the examination of the consequences of change. Medical educators began to express themselves more openly and frequently concerning the kinds of change anticipated or in process at their respective schools.[31] Behavioral and social scientists became more visible and involved in examining the nature of the processes and outcomes of medical education.[31,44,82,87,90] Perhaps most telling of all was the establishment in 1959 of divisions of research in medical education at Western Reserve University, the University of Illinois, and the Medical College of Virginia. (See Footnotes 110-123; 124-130; and 131-136.) Similar efforts later followed at Albany Medical College, the University of Southern California, and the University of Rochester. In very recent years, similar divisions have been established at four medical schools: Ohio State University, Hahneman, Michigan State University, and the Medical College of Georgia. There are now opportunities for persons to lead similar divisions at a dozen other schools of medicine. One view of the function of a division of research is expressed in a personal communication from E. F. Rosinski:

> When interest in research in medical education began, the purpose of the research was to provide data on all aspects of the educational (learning) process in medicine, so that medical education could be improved. Whether the research focused on the student, the teacher or the learning environment, its intent was to improve the quality of medical education. Perhaps it would best be described as "action research" . . . . All our research is still directed toward this goal . . . to have practical application for this institution.

Rosinski goes on to suggest that divisions of research at other medical schools may be less interested in problems specific to their own institutions than in problems related more broadly to medical education or to education itself.

A new development has taken place in the establishment of the Center for the Study of Medical Education at the University of Illinois College of Medicine. In addition to carrying out research on varied problems in medical education, the Center also is active in training physicians in educational research.

The Division of Research in Medical Education at Western Reserve has proposed the establishment of a Master of Arts in Medical Education Research program to prepare physicians to conduct educational research. A proposal for cooperative research in education in the health professions has also been introduced at Western Reserve.

The Schools of Medicine, Nursing, and Dentistry are establishing an Association for Cooperative Research and Development to share personnel, facilities, and equipment for research and development programs in education.

Curriculum development continues as a central topic of concern not only within individual medical schools but for the profession as a whole. Cope and Zacharias offer some bold suggestions for curriculums in the future, believing that fundamental changes are required. A basic suggestion is for a sharp reduction in the total amount of time required for the completion of medical school. "The primary recommendation of the report is that a series of steps be undertaken to increase the flexibility in college, in medical school and postgraduate training with a view to a sharp reduction in the total amount of time required for completion."[12, p. 13]

Bold recommendations for reform have also been made for the graduate education of physicians, exemplified by the suggestion of another study group that the internship "as a separate and distinct portion of medical education be abandoned."[152, p. 62]

Continuing examination of the needs for change is evident in the contributions to the literature in medical education, especially by persons who have participated in efforts to revise and develop educational programs, e.g., Wearn,[25] Evans,[16, 17] Caughey,[9, 10] and Willard.[26] There are many pressing issues on the current scene ranging from questions dealing specifically with curriculum to broader problems concerning the relation of the medical school to the university, to the other professions, and to society. Several references are discussed in Section VI: Graduate Education. Similar matters are being given thoughtful consideration by leaders in all areas of professional education.

III. CONTRIBUTIONS OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

The Association of American Medical Colleges (hereinafter referred to as AAMC) has made many and varied contributions to research in medical education, as several accounts indicate.[14, 43, 44, 54] These methods may, at best, only be summarized below.

Teaching Institutes

AAMC has sponsored annual institutes on teaching and administration.[27-38] The institute reports include extensive data on a variety of subjects: applicants, medical students, faculty members, department chairmen, and deans. They constitute an outstanding survey of the entire field of medical education, excluding residency training. One would agree with Sanazaro, director of the division of education, in his judgment that "in the aggregate, these constitute the most definitive characterization of any field of higher education . . . ." The institutes on medical school administration[37, 38] and the one dealing with relationships among medical schools, teaching hospitals, and universities[36] represent major analyses of administrative relationships and practices. Similar analyses are rarely found in any area of professional education.

The institutes of 1956 and 1957[30, 31] on the appraisal of applicants and the ecology of the medical student were important for substantive contributions in describing characteristics of the medical student, as noted in the next section. Darley suggests these institutes were particularly significant because they resulted in the organization of the AAMC Continuing Group on Student Affairs.[14, p. 97] This group has been in existence for ten years and has served as the principal forum for persons responsible for the recruitment, selection, and counseling of medical students.

Prior to the institutes themselves, AAMC conducted surveys to provide data for review and discussion. These surveys may be differentiated from the special studies sponsored by AAMC outlined below and included in the references under "Other Reports."

Special Studies

AAMC has conducted and published applicant studies annually since 1926. In 1946 it began its program in basic research in the measurement of intellectual and nonintellectual characteristics of medical students.[44] The study of students in 28 schools described in the next section is the largest study of its kind ever attempted in any profession.[46, 55] Many reports on a variety of topics have issued from this study.[45, 47, 48, 60, 61, 62] Student attrition has been a major recent interest; Johnson[50] and Hutchins[49] have prepared a definitive report which appeared as a supplement to the Journal of Medical Education in December, 1966.

The Division of Education

In recognition of the importance of promoting and stimulating research in medical education, the Division of Education was established in 1962. This division has developed a program of research and conceptual models for research beyond the initial studies noted above, directed to central issues in medical education.[54, 56, 59] One major interest lies in the study of indexes or correlates of educational effectiveness.[55] An example of this is the recent summary of available data on the educational correlates of class size in medical school.[58] In a personal communication from Sanazaro, he notes:

> The major source of new data on indexes of educational effectiveness have been the educational self-studies which have been sponsored by the Division since 1963. The self-studies are planned by the faculty and administration of a single medical school with the consultative assistance of the AAMC staff. In the course of each self-study, descriptive information is obtained on students, faculty, institutional characteristics, the nature of the climate for learning, educational program, and indexes of educational impact and effectiveness. This information is analyzed and compiled into a workbook. The faculty and administrative officers then analyze the data during a four to five-day seminar for the purpose of identifying problems which require resolution or opportunities for further strengthening their educational program. Schools which have conducted such self-studies followed by intramural seminars have moved more rapidly than is the usual case in bringing about changes which both faculty and administration identify as necessary and desirable. A summary report of educational self-studies conducted with four medical schools is currently in preparation by the Division of Education.

These self-studies of single medical schools are an extension of the seminars on teaching and learning developed at the University of Buffalo in 1955.[103-106]

The second major interest of the Division of Education is the clarification of criteria of professional performance as the ultimate criteria of medical education. The division is currently developing criteria of professional competence by means of an empirical study; in turn, these criteria will be applied to a sample of the graduates who had served as subjects of the original AAMC longitudinal study.[46] This effort will be unique in professional education; it will represent the first prospective study in which hypotheses generated on the basis of information available on students at the time of admission to medical school will be tested against objective performance measures following completion of training.

An activity sponsored by the Division of Education has been the Annual Conference on Research in Medical Education. These conferences have become a major natural forum for persons concerned with educational research within the broad field of medicine.[39-42] They have stimulated interest in research on the part of faculty members and have raised the standards of such research.

Studies of Faculty

A Division of Operational Studies was established in 1959 with responsibility for compiling information on faculty staffing patterns, faculty salaries, and the financing of medical education. Its principal interest is to provide resource information for administrative and operational purposes. In a personal communication the director, Dr. Lee Powers, writes:

> The Division carries on special noncontinuing studies such as practicing patterns of women physicians, construction fund needs, educational costs, teaching hospital-medical school program costs and others. Continuing studies include annual faculty salaries, expenditures by source of income, annual updating of the Faculty Register, consultation to schools and other institutions and agencies. The Division provides an information service on medical education, maintaining a reference library which includes all publications relating to medical education published since 1946. A monthly fact sheet is published known as "Datagrams."

The AAMC institutes involving medical center operations are usually the responsibility of this division, including the final published report. Powers' studies of faculty patterns are of considerable interest;[53] he has also made contributions in organizing conferences addressed to disseminating knowledge.[23]

The combined work of the Division of Education and the Division of Operational Studies are without parallel in other fields of professional education.

The assistance offered by AAMC to individual schools as a clearinghouse for information about applicants and admission, its efforts in publishing the Journal of Medical Education, its Division of International Education,[63] and the work of the Division of Education in developing library guides for the development of medical school libraries[52] are also to be noted. Finally, the major report by Coggeshall concerning the current and potential contributions of the AAMC to medical education and to society contains important material for persons in all professions.[43]

IV. STUDENT CHARACTERISTICS

In the development of research in professional education, studies of students tend to precede other areas of inquiry. Thus, there is an early interest in the applicant, the selection process, and the prediction of success in school. These emphases have been noted in the early studies in medical education, especially those preceding investigations of the effects of curriculum change,[72] and have been very much in evidence in research in dental education.[74, 177] Studies of students and their attitudes has been a continuing emphasis in nursing education.[160, 163, 168] And, of course, where research is associated with curriculum revision, attention naturally focuses on students. This pattern of study priority seems to have been true in the growth of research programs on both the college student and the student in professional education.

It is to be expected that the student, who is the principal focus of the educational process, will also be the target of investigation relating to that process. He is the product of the school and a representative of the school's contribution to the profession and to society. He is also visible, available, and captive. The reasons for interest in the student are obviously multiple. One factor frequently overlooked, however, is that methods have been more readily available for the measurement of traits and characteristics in students than the study of teaching methods, the analysis of the teaching-learning process, or the even more challenging task of evaluating the impacts of curriculum changes on a school's graduates. Efforts tend to center on things that can be measured rather than on phenomena that may be of interest but where suitable methods of evaluation are lacking. There are many attributes and qualities of the professional person recognized by educators as requiring priority for evaluation: these qualities include honesty or integrity, reliability, compassion, and sincerity. In the relative absence of valid and reliable measures of more complex behaviors, effort tends to center on characteristics that lend themselves to measurement. This seemed to be the case in the early studies in medical education; with the student as the focus, methods used for the measurement of individual traits and characteristics developed in other settings were transposed to the study of medical students. The early interest in selection studies drew this observation by Bloom:

> Research sought to identify the "best" student, that is, the student whose individual qualities "fit" the demands of medical school, and assumedly, the medical profession. This type of conception was not reserved for studies of medical education. It was generally the case in research on students at all levels of secondary and higher education. Its most direct expression was in the study of

> selection which, undoubtedly, is the most highly developed type of social science research on education.[85, p. 144]

Interest in selection as a topic for research has diminished noticeably in recent years. From his vantage point of more than 20 years' experience in selecting medical students Caughey has observed:

> I am fully prepared to defend the hypothesis that the importance of selection is greatly overrated by most medical faculties . . . . In fact, the admission process is in many medical schools as much one of salesmanship as it is of selection. The criteria by which a promising candidate is identified are much the same in all schools. An applicant who is considered excellent by one admission committee and is offered a place by it, will almost certainly be accepted by most of the medical schools to which he applies. The end result is that the best qualified candidates have the opportunity to select the medical school which they will attend, and their acceptance by several schools is simply an initial step in a process whose outcome will be determined by the choice of the students themselves . . . .[65]

A recent study by medical students suggests that students select the medical school; the school does not really select them.[111]

Measurement of Intellectual Characteristics

With attention initially centering on the process of selection and the prediction of success in medical school,[30, 44, 72] interest naturally focused on the use of the Medical College Admissions Test (MCAT) as a selection device. Since 1955, more than two dozen articles have been published reporting studies on the MCAT; extensive data on thousands of students are now available. As may be expected, much debate has occurred around the basic problem of translating results of the research based on the MCAT into operational programs of selection and education. Representative examples of data and critical analyses are found in the articles by Schumacher,[81] Gough et al.,[73] Sanazaro and Hutchins,[80] and Hill.[75]

The Measurement of Nonintellectual Characteristics

With the beginning of the study of students in 28 schools, there developed wide interest in the assessment of nonintellectual characteristics.[44] A variety of measures were employed, including the Allport-Vernon-Lindzey Study of Values, the Edwards Personal Preference Schedules, and the Strong Vocational Interest Blank. These studies served as a base for what later developed into the AAMC Longitudinal Study[46] and illustrate the adaptation of methods used in personality research to the study of medical students. Indeed, as Heist has noted, "The medical student of recent years can be described by the most complete body of psychological measurements ever collected on individuals with such singular occupational interest."[74, p. 215] In his own studies, Heist has examined diverse student populations in college, in dental schools,[177] and in the article cited he compares students in medicine, dentistry, law, and engineering on some of the instruments used in the large study of medical students. The evaluation of diversity in students and the study of personality characteristics as one approach to identifying diversity was a major development in research in higher education and later in professional education.

The AAMC study of students had multiple purposes:

1. To identify diversity in student populations at individual schools.

2. To identify diversity in student populations at different schools, thus permitting some basis for comparison. The characterization of diversity in students was a major contribution of the AAMC study in its earliest stages.[31, 44, 68]

3. To provide a basis for the analysis of the relationship between intellectual and nonintellectual factors in student performance and as these may be related to subsequent clinical performance and career choice.

4. To provide a basis for the analysis of change of students over a period of time, indicating what the effects of medical education seem to be for the diverse student populations.

5. To compare medical students with students in other professions on the basis of similar measures.

In effect, subsequent research on medical students and students in other professions has demonstrated that each objective, in some way, was realized. Of special interest has been the use of these measures for the identification of change, and thereby to study some of the effects of experiences in medical school.

Attitudes

The evaluation of student attitudes has been in the foreground of all research in professional education. Bloom gives a comprehensive account of the growth in the study of attitudes and values in the early studies in medical education and their central position in the development of the sociology of medical education:

> It is fully fifteen years since the field became active and one can count at least seven attempts, each with the full thrust of major team research organization and support, to study the processes by which medical students selectively acquire the attitudes and values of the physician's social role. If one looks over all of these studies, seeking the patterns of origin, frames of reference, methods and results one finds a wide-ranging discourse of the problem.[85, p. 143]

The use of attitude scales as developed by psychologists and extended by psychologists and sociologists has continued to attract much interest and remains a favorite method today.[66, 67, 70, 71, 76, 79, 86] Additional techniques have included the panel questionnaire and the method of participant observation as used by sociologists.[78, 85, 87, 90] The major project conducted by sociologists (from the University of Chicago) at the University of Kansas Medical School included a variety of procedures addressed to analyzing the "student culture."[82-84] A major part of Bloom's monograph is addressed to documenting the differences in opinion concerning the status of the medical student as presented by the Chicago group of sociologists and the analysis of the socialization of the medical student as presented by sociologists of the Columbia University Bureau of Applied Social Research.[89, 90, 91]

One of the common interests underlying the study of attitudes and the study of nonintellectual characteristics was the goal of identifying the impacts of schools on students. Other types of research also sharing this purpose, varying from attempts to identify students' perceptions of environment[45, 47] to detailed descriptions of individual students, including reference to patterns of development and styles of learning,[118, 119] are discussed in Section V. Biographical characteristics of students as related to various aspects of performance have also been examined.[60, 120, 121] Diversity in student characteristics, first noted as a major trend in AAMC contributions and in studies at individual medical schools,[31] has not only persisted as a continuing research emphasis but is also being given attention in the analysis of curriculum needs.[69] Individual differences in students continue as a major concern for educators and researchers in medical education as exemplified in the current work of the Commission on Medical Students, APA Conference on Psychiatry and Medical Education.[11]

Career Choice

The analysis of factors associated with students' decision-making processes concerning careers in medicine has been a point of convergence for different types of investigators, ranging from those concerned with the logistics of supply and demand for different fields and those concerned with the analysis of the process of decision-making itself.[156] It is an area in which one can clearly document change in medical students' attitudes, opinions, suggested relationships between personality and other factors, and the choice of specialties.[61, 62, 137, 146, 154, 156, 157] Webster has prepared the most comprehensive analysis yet made on research concerning the process of career choice in medical students.[156] One of Webster's conclusions is as follows:

> There has been a notable increase in research relevant to career choice during the past 15 years and a less notable increase in research on medical practice and medical career patterns. The major contribution has been information relevant to admissions committees, school administrators and health program administrators; there has been considerably less contribution of direct usefulness to students and their teachers.

Analysis of Change

Investigators working in the area of student characteristics seem to have shared, more than any one other single interest, the objective of describing change in students, including the forces operating to produce change, whether one talks about change in attitudes, in habits, in values, or opinions concerning careers. The analysis of change is being approached from multiple points of view and at varied levels of abstraction by teachers as well as researchers. We may be at the threshold of developing a set of concepts suitable for embracing a variety of lines of evidence now being produced by the different researches in the field from studies of college students through studies of the professions. Sanazaro has developed an interesting conceptual model for the analysis of the educational process in medicine,[55, 57] while Abrahamson has urged development of a theoretical framework for research in professional education. "Its beginning," he has said, "would be a major contribution to research effort."[6, p. 343]

V. THE TEACHING-LEARNING PROCESS

Professional schools are not only concerned with the curriculum and the student; they are also interested in the nature of the teaching-learning process as it is evident from day to day and as its effects may be judged cumulatively over given periods of time. To be concerned with the impacts of curriculum on the student is to ask about the results of the teaching-learning process. An understanding of this process, in a broad sense, is perhaps the basic problem in educational research.

Educational research in professional schools is heavily invested in measurement of the gains of learning and in studies of teaching methods and methods of evaluation. In his review, Abrahamson concludes that the research is "increasing astonishingly in quantity and quite steadily in quality . . . it tends to be descriptive except for that on instructional techniques and materials in which experimental investigation is under way."[6, p. 343] Under the heading of "techniques and materials of instruction," Abrahamson covers studies pertaining to the evaluation of methods of teaching, including methods of testing and grading.

For purposes of our review we have chosen to use the broad category of the "teaching-learning process" under which at least four separate groups of studies and reports may be identified: (1) the teacher, (2) techniques and materials of instruction, (3) the student, and (4) evaluation.

1. The Teacher

Reference has already been made to the AAMC surveys of the characteristics of medical faculties.[53] Other studies have sought to describe the characteristics of the teacher as he performs his tasks and to evaluate his effectiveness as an instrument for learning.[96, 103-106, 110, 117, 122, 125, 129] Studies in medicine, dentistry, and nursing have ranged over a broad spectrum of topics, including the recruitment, training, and evaluation of the teacher.[32, 33, 36, 94, 101, 158, 174, 175, 182]

A major early contribution to the analysis of teaching in medical education was made at the University of Buffalo, described by one of its participants as follows:

> In medical education, more than in other areas of professional education, there has been an increase in research on improvement of teaching. One major impetus was the University of Buffalo project in medical education, which began with a test of the hypothesis that medical school teachers might profit from seminars in education. The project then tested the hypothesis that intensive summer workshops might improve instruction, primarily through a change in attitudes. Faculty teaching practices and attitudes were studied in seven different medical schools. Jason designed a series of rating scales with a high interrater reliability and

> observed teaching practices in seven medical schools, using teams of six observers in each--three medical educators and three educationists. An accompanying study reported by Rosinski and Miller tested faculty attitudes in the same seven medical schools and with a series of attitude scales developed by Rosinski.[6, p. 343]

Members of the original Buffalo Project collaborated on a book which has been recognized as a unique contribution in professional education;[101] attention is directed to the chapter "The Teacher Teaches."[p. 65] Miller, the senior author, has established a Center for the Study of Medical Education in which, as noted previously, the training of physicians in educational research is a major responsibility. This is the first venture of this nature within a profession.

2. Techniques and Materials of Instruction

The research literature in professional education is growing more rapidly in this area than in any other. Studies cover a variety of topics including: comparison of methods of teaching; the influence of testing and grading methods on learning; the relationship of attitudes and other personality variables to performance; the use of programmed instruction, of television and other methods; and the comparison of various approaches to learning as well as teaching.

Of particular note in medical education is the wide interest in the construction and use of examinations as measures of evaluation, teaching, and learning.[95, 98, 100, 126-128, 136] The papers prepared for the Annual Conferences on Research in Medical Education, 1962-66,[39-42] reflect the great interest in the evaluation of teaching methods and the gains in learning. Experimental approaches to teaching methods and use of the so-called newer modes of instruction, e.g., programmed instruction and television, are widespread.[97, 99, 108, 124, 130] These emphases may be noted in dentistry and nursing as well as in medical education.[165, 173, 176, 180, 183-185] References have been selected merely to sample the many studies in this area reported in the last half-dozen years. One would underscore Abrahamson's observation that experimental investigation is under way here whereas in other areas of evaluation, descriptive methods are more frequent. A contributing factor is that comparison of methods of teaching or learning lends itself to experimental and statistical analysis more readily than other problems selected for study. Concerning the use of statistical methods, a somewhat curious phenomenon is evident: an increasing number of studies are being reported in which the statistical techniques used are far more sophisticated than the problem under investigation appears to deserve. Expressed another way, the level of statistical significance sought for is far in excess of the apparent level of significance of the problem studied.

3. The Student

In the previous section we referred briefly to studies of student characteristics in the areas of attitudes, values, and personality. Here we would draw attention to descriptive and anecdotal accounts of individual students studied over varying periods of time as they responded to specific environments for learning. Horowitz reported results of an intensive study of 20 medical students followed for four years in medical school and five years after graduation, giving special emphasis to patterns of development.[118] Styles of learning and their relation to learning outcomes were also examined by Horowitz.[119] Lief and his colleagues have described patterns of adaptation and specific areas of concern in medical students.[77, 78] Accounts of students' interactions with the environments provided by a medical school and their consequences have been reported by Becker et al.[82, 84] In studies of the type noted, less attention tends to be given to traits or characteristics likely to identify differences among groups of students than to features related to continuing, dynamic interactions with environments. The Commission on Medical Students of the American Psychiatric Association's Conference on Psychiatry and Medical Education has made major recommendations concerning the need for renewed emphasis on the total development of the medical student.[11] Medical educators are showing continuing interest in the personal and emotional growth as well as in the professionalization process of medical students.

4. Evaluation

All professional schools are vitally concerned with devising appropriate methods of evaluation to determine whether curriculum objectives are realized. The growth of divisions of research in education in medical schools has been largely in response to the stimulus of questions related to evaluation, for specialists in tests and measurements have clearly stimulated medical faculties to examine the adequacy of techniques for student assessment.

Evaluation, of course, is a broad and complex subject. It is but one of the several components of an educational program which also includes a statement of objectives and specific learning experiences (covering curriculum, methods of instruction, teaching materials, etc.). Each component affects and is, in turn, affected by the others. As professional schools show interest in clarification of objectives and the development of learning experiences, so must they be equally concerned with evaluation. This has been amply recognized in those medical schools establishing educational research divisions.

Of interest are the varied emphases of these groups at the several medical schools in which organized research programs were first developed. At the Medical College of Virginia, for example, an early project was to identify curriculum objectives and to help the faculty recognize the overlapping of content in the various areas of teaching.[135] At Western Reserve, studies evolved around education for problem-solving[113, 114, 116] and the development of the individual student.[118] At the University of Illinois, early studies were directed at examination methods and their relationship to evaluation of teaching and learning.[127, 128] Varied models have been followed in the organization of evaluation studies within and among medical schools and in the efforts of extramural organizations such as AAMC and the National Board of Medical Examiners.[100]

The general topic of the teaching-learning process obviously encompasses multiple and highly diverse interests. It would appear appropriate to quote an editorial by Sanazaro in which he described what he regards as significant questions for research:

> The number of individuals qualified to conduct sound educational research remains inadequate to the demand. For this reason, they should devote their efforts to truly significant questions rather than to the myriad small studies which it is possible to do with exquisite precision and total absence of effect on educational policy and planning. Among the many important questions on which research is needed are the extent to which a school can increase its enrollment without sacrificing the quality of its current educational program; the design and effectiveness of courses intended to foster student attitudes of independent study; the feasible means of applying new teaching aids and programs of independent study; the influence of different types of patient populations on student attitudes toward patients; the degree of clinical responsibility which can be assigned to students and its resultant effect on student learning and patient care; the effects of an academic counselling program on career planning; the educational feasibility and effectiveness of assigning formal instructional responsibilities to

> advanced residents, Fellows and graduate students; the effects of establishing a core instructional program among basic medical science departments; the effectiveness of a basic general clinical clerkship as compared with the present rotating clerkships and performance in medical school on students admitted with atypical academic backgrounds or with advanced placement credits in selected basic medical sciences.[56, p. 295-96]

Most of the "truly significant" questions refer to needs for studies of teaching methods, including what is to be taught as well as who will do the teaching and for what purposes. Furthermore, looking at the questions as a whole we are led back to the very headings used in this section: the teacher, techniques and materials of instruction, the student, and evaluation. Their interrelationships are also evident. The added component, taken broadly, is the curriculum. It is likely that if leaders in any field of professional education were asked for a list of significant questions for research, their list would represent similar basic concerns. Additionally, if the questions were viewed as a totality, it would be possible to see their patterning in the same manner as in the list above.

VI. FOLLOW-UP AND CAREER STUDIES, GRADUATE AND CONTINUING EDUCATION

Research in medical education embraces studies of the performance of the graduate physician, inquiry concerning training beyond medical school in the traditional internship and residency periods, and investigations of the rapidly growing efforts in continuing education. All professional schools are, of course, interested in the performance of graduates and many are willing to commit themselves to graduate or continuing education programs. This appears especially true for the health professions where it is recognized that professional competency requires advanced and continuing education and training.

Graduate medical education is unique among the professions as noted below:

> Lawyers, ministers, engineers, physicists, historians, and other professionals are educated in a system under which the whole course of education, undergraduate and graduate, is a continuing responsibility of educational institutions, in which each department functions not only as a unit but also as an integral part of the whole university whose institutional standards and policies must be satisfied, and which, in turn, must meet external standards of review and accreditation.
>
> Medical education differs from other professional education in the extent to which the young physician must have many opportunities to observe and work upon living patients

> who are suffering from a variety of afflictions. So great is this difference that it may not be possible or even desirable to organize and structure graduate education in medicine in the same pattern as in other fields. However that may be, it must be emphasized that graduate education is unique among the fields of graduate and professional education in being a responsibility of institutions which have service rather than education as their primary function. It is unusual, in that responsibility is divided among more than a thousand hospitals instead of among a few score universities or medical schools. It is in a class by itself in the extent to which responsibility reposes in individuals rather than in faculties.[152, p. 16-17]

The outstanding study of the practicing physician has been reported by Peterson and his associates who attempted to describe and evaluate the behavior of general practitioners in North Carolina.[149] An extensive study of Canadian physicians, with results supporting those of Peterson, has been described by Clute.[139] Price and his colleagues assessed the performance of physicians throughout the state of Utah, including full-time faculty members at the College of Medicine, University of Utah.[150] Kendall reviewed in detail the relationship between medical practitioners and medical educators.[148] Mawardi's comprehensive study of the graduates of one school promises to illuminate many issues concerning the careers of physicians, especially the satisfactions and dissatisfactions in various types of medical careers.[123] Weiskotten et al. have reported on changes in careers of physicians.[157] There is much interest in the characteristics of practising physicians, especially the attitudes of those in academic medicine.[141, 143, 144, 147, 152]

There are a number of studies of choice of specialty and characteristics of persons in various specialties. Tucker and Strong in a 10-year follow-up of medical school seniors reported the effectiveness of interest tests in predicting whether students will specialize and which specialty they are likely to enter.[154] Glaser[142] and Boverman[137] reported on factors affecting choice of internship and specialties. Schumacher investigated choice of specialty as related to personality characteristics revealed by medical students at the time of their schooling.[61, 62] Holt and Luborsky have made the most detailed study of the personality characteristics and performance of physicians in one specialty--in this instance, psychiatry.[146]

The AAMC is planning a follow-up study of the clinical performance of physicians who earlier had been studied as medical students.[55] It is also planning to consider the manner in which the medical care system is provided and to review studies intending to "increase the efficiency and effectiveness of the educational system."[57]

An impressive array of courses and seminars are available to all physicians in all specialties,[138] and attempts are being made to evaluate the effectiveness of the methods and content of teaching. The needs for continuing education of physicians have been amply documented by Dryer.[140] A detailed survey of medical communications sources available for this education has been reported by Harris.[145] Research reports on graduate and continuing education are now given regularly at the Annual Conference on Research in Medical Education.[40-42]

Concern over the future of medicine is seen especially clearly in attempts to clarify the needs for physicians and the responsibilities and challenges in preparing physicians to work in a changing society. In addition to the Coggeshall report,[43] three other studies offer ample evidence of the real concerns of leaders in medical education.[151, 153, 155] The very recent report by the Citizens Commission on Graduate Medical Education may be the most effective document of all: the deficiencies and problems in the training of the physician in the years of internship and residency are candidly described and a number of proposals for change are made.[152]

VII. NURSING AND DENTISTRY

Nursing

The nursing profession is changing in many ways. Increased demands for service, resulting in part from the great expansion in programs of patient care and a number of developments at the several levels of nursing education, are prompting changes in the nature of the nursing profession. The need for reform in nursing education is summarized in the Platt Committee Report.[159] Boyle examines issues in collegiate programs.[161] Nahm describes students' expectations.[169] The implications of curriculum change for teaching nursing are considered by Nelson.[170] A conference on doctoral education in nursing held at Western Reserve University is reported in Nursing Forum, vol. 5, p. 48-104. 1966. These are but a few references to a very rapidly growing literature. The publications catalogue of the National League for Nursing (1966) lists many reports in the broad field of nursing education. Meeth's annotated bibliography[158] contains many useful references.

As a very rapidly developing profession, nursing faces certain problems as suggested by Evans:

> Because nursing is the most rapidly developing profession concerned with direct personal patient care, it provides examples of natural, but often seemingly unmanageable factors which operate to disrupt rather than enhance the processes of teamwork. The striving of groups within nursing for status, position and authority tends to blur the nursing goal and total patient care to the extent that some seem to lose sight of it altogether. Although there is a considerable research in nursing function, there is virtually none concerning the interrelationships between nursing and other health services and total patient care. If this situation continues, it will result in an increase in interprofessional tensions rather than a diminution as nursing will and must assume greater responsibility in total patient care. The aim of today's patient care should be integration and continuity of services rather than disjointed and intermittent care.[16, p. 68]

Despite these significant problems, the nursing profession is making notable advances in curriculum innovation and development and in the conduct of research in education. A very small sample of this research is presented below.

The profession, for example, is taking steps toward placing responsibility for the training of nurses in educational institutions rather than hospital service institutions. Baccalaureate education is being designated as preparation for the professional nurse while community college and hospital diploma programs are regarded as providing technical training. These trends have obvious implications for research: a good example is the study identifying characteristics of nursing students in the various types of programs, including those in practical nursing. Using data drawn from an ongoing 20-year study of nurse-career patterns of 14,500 students who entered 376 schools in 1962, Tate and Knopf differentiated four types of programs (diploma, baccalaureate, associate degree, and practical nursing) and the characteristics of the students in them.[171] Additional study of each group is being sponsored by the National League for Nursing. The selection and guidance of candidates for all these training programs is of considerable interest to nursing. Likewise, the characteristics of nursing students in different programs is a continuing research emphasis,[166] one that may be likened to interest in student characteristics in the early stages of research in other professions.

Research concerning the attitudes and development of students in baccalaureate programs has been a principal interest of Davis and other sociologists.[163-165] This collaboration of social scientists with nursing educators in a specific school represents an innovation in nursing education research. Studies of attitude and behavior change represent major emphases in nursing education research.[160, 168]

Inquiry has also been directed at assessment of teaching methods, including the use of programmed instruction,[162] television,[173] and the development of instruments to evaluate nursing performance.[172] The critical incident method has been a major approach to the analysis of nursing performance.[167]

Dentistry

The New York State Committee on Medical Education, in its report on education for the health profession, described the current period of promise in dentistry and dental education as follows:

> Dentistry and dental education are entering a period of marked and promising change. In the past much of dental education has been oriented more to the training of a competent technician than a true professional man, and much of dental practice has been devoted to such routine procedures as cleaning teeth and filling simple cavities. Compared with medical schools, most dental schools have done little to advance scientific knowledge. In recent years, under the stimulus of grants from the National Institutes of Health, this situation has begun to improve, but limitations in both faculties and facilities still act as a drag on progress.[182, p. 23]

The Commission on the Survey of Dentistry in the United States made several recommendations for educational research in 1960:

> 1. Organizations such as the American Association of Dental Schools arrange and conduct a series of institutes or conferences for dental teachers to improve the content and correlation of courses.
>
> 2. Dental schools make curriculums more flexible and stimulating. Where possible, honor programs should be arranged for gifted students.
>
> 3. Dental schools develop or improve organized programs for the counseling of undergraduate dental students.[175, p. 46-67]

Additionally, the commission recommended:

> Every dental school expand or develop a program to evaluate the effectiveness of its teaching. The methods to be employed should be decided upon by the Dean and the faculty cooperatively, but provisions should be made for student participation.
>
> The American Dental Association reevaluate the activities of the Council on Dental Education for the purpose of

> permitting the Council to perform its function of accreditation more effectively.[175, p. 49]

There is evidence that these recommendations are now being implemented. For example, the report, Research Projects in Dental Education, published by the American Association of Dental Schools, indicates that a number of relevant projects in dental education research are now under way.[174] The following appear to be the principal categories of research.

1. Student attitudes and personality characteristics.

2. Teaching methods (or techniques and materials of instruction), including grading, examinations, and the prediction of academic performance.

3. Studies of faculty, including recruitment and training, analysis of manpower needs, faculty attitudes toward students and dentistry, and the evaluation of teachers' performance.

Dr. Dale Mattson, in his report as director of the Division of Educational Research, American Association of Dental Schools, reminds the faculties of dental schools of the need for cooperation in educational research and the importance of qualifications, characteristics, and behavior of dental educators in determining the quality and character of dental education.

At the University of Pittsburgh School of Dentistry, R. S. Mackenzie is pursuing a variety of projects covering interests in the student, the curriculum, the teacher, and the practitioner. The studies include: (1) a job analysis of dentistry carried out on private practitioners; (2) a statement of objectives for curriculum and the development of a group of criterion measures to evaluate the achievement of these objectives; (3) the effectiveness of an in-service training program for faculty; and (4) the effectiveness of experimental recruitment procedures on the quality of applicants to dental school.

In 1965 the first national conference on research in dental education attracted nearly 200 delegates. Recommendations included the following: dental schools must work to attract and educate excellent faculties and devote energies to research and to making this research available. It was stressed at the conference that preparation of students for the professions includes helping them become aware of the place of research and increasing their motivation for research.

Some of the early research in dental education included Heist's study of personality characteristics in dental students,[177] Hood's work on the prediction of achievement in dental school,[178] and Manhold and Manhold's eight-year study of the efficiency of the dental aptitude test in predicting performance.[179] Additional recent interests center on studies of methods of teaching and learning, including programmed learning and television[176, 180, 183] and methods of self-instruction.[184, 185]

VIII. AN OVERVIEW

Research in professional education, in Abrahamson's words, "is growing astonishingly in quantity." In the health professions, and in medical education especially, educational research programs are being pursued vigorously in many schools in a variety of areas. There is collaboration among schools and between schools and extramural organizations. In the health professions, three organizations have played important roles in educational research: the Association of American Medical Colleges, the National League for Nursing, and the American Association of Dental Schools.

Research in the health professions exemplifies the advantages of cooperation among institutions and also illustrates the advantages of interdisciplinary collaboration in the conducting of research itself. Psychologists, sociologists, and, more recently, educationists, are making significant contributions to research in the health professions and in professional education as a whole.

A major trend is the increasing number of studies investigating teaching methods or the techniques and materials of instruction. Methods of self-instruction, programmed learning, and the use of other technical innovations, e.g., television, are attracting much research interest.

A concomitant development with the emphasis on methods of teaching is the interest in the teacher himself. The basic concerns with the need for teaching manpower, including the recruitment and training of faculty, are being supplemented by studies of the characteristics of the teacher, his work and its evaluation. The professions appear quite willing to examine the teacher in their investigation of the teaching process. This is not to say that the student, the curriculum, or the evaluation process are being neglected.

There appears to be some correlation between the place of research in a profession with that profession's willingness to study its educational methods. The research orientation in medicine seemed to serve as an appropriate backdrop for the growth of interest in medical education, for example. It is a point being given renewed recognition in dentistry and has for some time been recognized in nursing education. It is also evident in other areas of professional education, for example, in engineering.

In the early stages of research in professional education, the tendency seems to be to pay much attention to the student. Then, attention increasingly is focused on teaching methods, the curriculum, and the evaluation of the products of the curriculum. Though all schools are vitally concerned with their graduates, research attention on the practitioner is given low priority. It would appear that there is a progressive concern with the graduate and less emphasis on the incoming student as the professional school shows an increasing maturity and self-confidence. In medicine, despite the acknowledged need for studying the practitioner, relatively little research effort has hitherto centered on the performance of graduates. Increasing attention is now being given to the needs for postgraduate training, and continuing education will have a salutary effect on research concerning the latter phases of the physician's development. There are complicating factors in the examination of professional competence in medicine. For example, the interests and activities of certifying boards are not currently under the jurisdiction of medical schools.

If any profession were asked to identify significant questions for educational research, it is likely that the kinds of concerns reflected in the questions would be similar despite the differences in the professions. The following is a list of topics of concern to all professional education:

1. Are there principles in the organization and offering of a curriculum that are especially relevant for professional education?

2. How may a curriculum be accommodated to students with major individual differences and backgrounds?

3. What assumptions can be made concerning expectations

that "the student" participate in and take responsibility for his own education?

4. A related question: Can the so-called newer methods of teaching and learning, especially those putting a premium on self-instruction, be adapted to professional education?

5. In what ways can a professional school help the student in the process of career planning?

6. Can advanced students participate effectively in educational programs for younger students? How may they best be used in professional schools?

7. What kind of a formal and informal scheme can be devised to evaluate whether the curriculum objectives have been achieved both for all students and for each individual?

As noted in the text, there is need for a suitable theory within which to conceptualize the findings already available in research in professional education. With so much occurring on so many fronts, a few coordinating concepts are needed as guides. Only recently have suggestions been made toward formulating a theory suitable to describing the nature of the development of the college student. It is to be hoped that comparable efforts will be made in relation to the professional student and professional education.

A continuing dilemma will center on how the work that goes on within individual schools may be harmonized with the interests of the profession as a whole. Institutional self-study programs extend local and possible parochial interest in the teaching-learning process. Relevance of what occurs in one institution must always be examined with respect to the larger interests of a profession and other professions.

The need for cooperation among schools within a profession and among schools of different professions within a university is self-evident. As educational and research technologies grow more complex, greater reliance will have to be placed on cooperative ventures in which the strengths of individuals and organizations may best be used.

FOOTNOTES

I. Professional Education: Characteristics and Research

The following references consider the nature of a profession, the meaning of becoming "professionalized," and the various problems and patterns of professional education. Of special interest are the issues identified in defining the meaning of a profession.

1. G. Lester Anderson, "Professional Education: Present Status and Continuing Problems." In N. B. Henry, ed., Education for the Professions, 61st Yearbook of the National Society for the Study of Education. Chicago, University of Chicago Press, 1962.

2. Howard S. Becker, "The Nature of a Profession." In N. B. Henry, ed., *op. cit.*

Becker reviews the attempts to answer the question "What is a Profession?" and provides a useful statement and integration of the various definitions. He suggests additional meanings of the concept of profession and comments on their implications for education.

3. Nelson B. Henry, ed., Education for the Professions, 61st Yearbook of the National Society for the Study of Education. Chicago, University of Chicago Press, 1962.

4. William J. McGlothlin, Patterns of Professional Education. New York, G. P. Putnam's, 1960.

5. H. L. Wilensky, "The Professionalization of Everyone?" American Journal of Sociology, vol. 70, No. 2, p. 137-58. 1964.

Wilensky examines the popular generalization that occupations are becoming professionalized. Two main themes are: few occupations will achieve the authority of the established professions; if we call everything professionalization, the newer structural forms emerging will be obscured. The history of 18 occupations suggests a typical process by which the established professions have arrived.

II. Curriculum Development, Innovation and Institutional Self-Study

6. Stephen Abrahamson, "Professional Education." Review of Educational Research, vol. 35, p. 335-44. 1965.

The author reviewed more than 400 separate research reports for a review chapter on research in professional education and limited his coverage to education for medicine, dentistry, nursing, law, social work, and engineering. The chapter includes sections on students, curriculum development, techniques and materials of instruction, and faculty. There is an extended reference list.

7. George P. Berry, "Medical Education in Transition." Journal of Medical Education, vol. 28, Pt. 2, p. 17-42. 1953.

8. John L. Caughey, Jr., "Education for Professional Roles in Comprehensive Health Service." Teachers College Record, vol. 58, p. 9-18. 1956.

9. ______________, "The Medical Student: His Education and His Goals." Western Reserve University School of Medicine, Alumni Bulletin, vol. 30, Pt. 1, p. 13, 1966.

In item 9 Caughey delineates the dilemma of preparing a personal physician or family doctor for the delivery of comprehensive health care and to fill community health needs. Educational programs must be developed to produce these doctors, he says in item 8. In his view, medical education is open to a severe indictment: the value judgments being imparted to our future physicians are being determined more by the professional interests of the most influential faculty and hospital staff members than by any studious analysis of the health needs of the community and the kinds of products schools should be creating.

10. ______________, "Obligations of Medical Schools to Students." Journal of the American Medical Association, vol. 185, p. 107-11. 1963.

11. Conference on Psychiatry and Medical Education, under the auspices of the American Psychiatric Association and the Association of American Medical Colleges, 1966-68.

This conference will assess all aspects of teaching psychiatry to undergraduate medical students in the light of the changes in the theory, practice, and role of psychiatry that have occurred since the report of the last major conference on psychiatry in medical education held at Cornell University in 1951. The report of the present conference will be available in 1968. Its recommendations will undoubtedly have much influence on the role of psychiatry in medical education in the next decade. It promises to be one of the most comprehensive analyses of any discipline represented in the medical school curriculum.

12. Oliver Cope and Jerrold Zacharias, Medical Education Reconsidered, Report of the Endicott House Summer Study on Medical Education, July, 1965. Philadelphia, J. B. Lippincott, 1966.

13. Ward Darley, "Studies and Research in Medical Education." Journal of Medical Education, vol. 34, p. 625-30. 1959.

14. ______________, "Research in Medical Education." Journal of Medical Education, vol. 39, p. 97-98. 1964.

15. John E. Dietrick and Robert C. Berson, Medical Schools in the United States at Mid-Century. New York, McGraw-Hill, 1953.

16. Lester J. Evans, The Crisis in Medical Education. The University of Michigan Press, 1964.

17. ______________, "The Baselines of Medical Center Education." Annals of the New York Academy of Sciences, vol. 128, Art. 2, p. 633-40. 1965.

Evans discusses the current readjustment process in medical education.

18. Abraham Flexner, "Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching." New York, The Carnegie Foundation, 1910.

19. K. R. Hammond and F. Kern, Jr., Teaching Comprehensive Medical Care. Cambridge, Mass., Harvard University Press, 1959.

20. Peter V. Lee, "Medical Schools and the Changing Times: Nine Case Reports on Experimentation in Medical Education." Journal of Medical Education, vol. 36, No. 12, Pt. 2, p. 45-128. December, 1961.

Lee examines nine medical schools in which experiments and innovation in medical education were conducted. The reader who is not acquainted with recent changes in medical education will find these case reports an excellent introduction.

21. ______________, "Experimentation in Medical Education: The Student, the Patient and the University." Annals of the New York Academy of Sciences, vol. 128, Art. 2, p. 532-43. 1965.

Lee reviews current experiments in the context of two basic problems facing medical education; "The need to rediscover the student as the reason for medical education, and the patient as the reason for medicine, without whom the student cannot learn." Lee relates his observations to those made by Evans in The Crisis in Medical Education, op. cit.

22. "Medical Education in the United States," prepared by the staff of the Council on Medical Education. Journal of the American Medical Association, vol. 190, p. 146-224. November, 1964.

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III. Contributions of the Association of American Medical Colleges

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34. "Medical Education and Medical Care." C. G. Sheps, G. A. Wolf, Jr., and C. Jacobsen, eds., Journal of Medical Education, vol. 36, No. 12, Pt. 2. December, 1961.

35. "Research and Medical Education." J. H. Comroe, Jr., ed., Journal of Medical Education, vol. 37, No. 12, Pt. 2. December, 1962.

36. "Medical Education and Practice: Relationships and Responsibilities in a Changing Society." S. G. Wolf, Jr., and Ward Darley, eds., Journal of Medical Education, vol. 40, No. 1, Pt. 2. January, 1965.

37. "Report of the First Institute on Medical School Administration." R. M. Bucher and L. Powers, eds., Journal of Medical Education, vol. 39, No. 11, Pt. 2. November, 1964.

38. "Report of the Second Administrative Institute Medical School--Teaching Hospital Relations." G. A. Wolf, Jr., and others, eds., Journal of Medical Education, vol. 40, No. 11, Pt. 2. November, 1965.

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49. ______________, "The AAMC Study of Medical Student Attrition: School Characteristics and Dropout Rate." Journal of Medical Education, vol. 40, p. 921-27. 1965.

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The author, director of the Division of Education of AAMC, describes the proposed program of the Division.

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This editorial examines the purposes of research in medical education.

57. ______________, "An Agenda for Research in Medical Education." Journal of the American Medical Association, vol. 197, p. 979-84.

September, 1966.

Here Sanazaro discusses the kinds of research needed in medical education.

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This article summarizes available data on the correlates of class size in medical school.

59. ______________, "Research in Patient Care: Its Relevance to Medical Education." Journal of Medical Education, vol. 39, p. 1121-22. 1964.

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182. New York State Committee on Medical Education, Education for the Health Professions. Albany, New York, 1963.

183. M. T. Romano, "Television in Dental Education." Journal of Dental Education, vol. 28, p. 429-93. 1964.

184. U. S. Department of Health, Education and Welfare, Division of Dental Health and Resources, An Experimental Test for Self-instructional Methods in Postgraduate Dental Education. San Francisco, 1964.

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ANNOTATED BIBLIOGRAPHY

I. Professional Education: Characteristics and Research

1. Henry, Nelson B., ed., Education for the Professions. 61st Yearbook of the National Society for the Study of Education, Chicago, University of Chicago Press, 1962.

This Yearbook, consisting of 12 chapters addressed to describing current trends in professional education, provides an excellent overview of the nature and meaning of professional education, case studies of four professions, the graduate school as professional school, the forces influencing the character of professional education, and basic considerations in education for a profession.

II. Curriculum Development, Innovation and Institutional Self-Study

2. Cope, Oliver and Jerrold Zacharias, Medical Education Reconsidered. Report of the Endicott House Summer Study on Medical Education, July, 1965, Philadelphia, J. B. Lippincott, 1966.

This small volume (89 pages) reports a conference dealing with needs for revising curriculums in medical schools and presents four curriculum plans to meet these needs. An incisive analysis of current needs in medical education by leaders in the field, this volume should be useful to persons in and out of medical education. Those interested in curriculum planning and design in relation to specific objectives will find the book an interesting contribution.

3. Evans, Lester J., The Crisis in Medical Education. Ann Arbor, University of Michigan Press, 1964.

Evans draws on his broad qualifications in medical education and medicine to describe the urgent need for university responsibility for medical education, saying; "The elements essential for medicine's continued growth can only be found in the University." Evans identifies basic needs in health profession education: to rediscover the student as the reason for professional education and to study patient care.

4. Hammond, K. R. and F. Kern, Jr., Teaching Comprehensive Medical Care. Cambridge, Mass., Harvard University Press, 1959.

This is one of the first reports of a curriculum change in medical school and the attempt to evaluate the effects of this change on students. It describes experiences with the General Medical Clinic at the University of Colorado School of Medicine, a new program designed to encourage the medical student to learn comprehensive medical care. The major part of the book is a report of the study designed to evaluate its effects. It is especially useful in reflecting the combined work of psychologists and physicians in developing methods of evaluation appropriate to a specific environment, and also exemplifies an experimental design in research in medical education using the method of controlled observation.

5. Lee, Peter V., "Medical Schools and the Changing Times: Nine Case Reports on Experimentation in Medical Education." Journal of Medical Education, vol. 36, No. 12, Pt. 2. December, 1961.

Lee examines nine medical schools in which experiments and innovation in medical education were conducted. The reader who is not acquainted with recent changes in medical education will find these case reports an excellent introduction.

6. "Medical Schools and Teaching Hospitals: Curriculum, Programming and Planning." Annals of the New York Academy of Sciences, vol. 128, Art. 2, p. 457-720. 1965. L. Powers and R. Trussell, conference cochairmen.

This volume is a report of the proceedings of a conference sponsored by the New York Academy of Sciences addressed to improving the scope and quality of medical education and the facilities dedicated to medical training and research. 30 papers are presented with illustrations and complete bibliographies. Topics range across the wide spectrum of medical education.

III. Contributions of the Association of American Medical Colleges

7. "The Appraisal of Applicants to Medical School." H. H. Gee and J. R. Cowles, eds., Journal of Medical Education, vol. 32, No. 10, Pt. 2. October, 1957.

This is one of a pair of institutes on the evaluation of the student. The focus of this institute is on the evaluation of applicants to medical schools, the criteria of their selection, assessment of intellectual and nonintellectual characteristics, and the nature of the admissions process. It was hoped that this institute plus the one to follow it (see 8 below) would serve to stimulate new researches on the medical student. The numerous publications in this field in the last ten years bear much testimony that at least for these purposes both institutes were successful.

8. "The Ecology of the Medical Student." H. H. Gee and R. J. Glaser, eds., Journal of Medical Education, vol. 33, No. 10, Pt. 2. October, 1958.

This companion piece to the institute described above, reports the proceedings of the 1957 institute on the "complex factors that affect the student's overall environment once he enters medical school." The topics considered include: intramural and non-curricular factors affecting the medical student; the diversity of values and objectives in medical education; and the development of professional attitudes and capacities and educational patterns for medicine. In both institutes, medical educators grew increasingly aware of the helpful role of social scientists in evaluating the problems of medical education and in collaborating on studies designed to provide useful information about students. Both reports occupy pivotal positions in stimulating interest in research on medical students. The reports also illustrate the role of the Association of American Medical Colleges in stimulating research among medical schools as well as in conducting important studies of its own.

9. Coggeshall, Lowell T., Planning for Medical Progress Through Education. Evanston, Ill., Association of American Medical Colleges, 1965.

This report of a study conducted for AAMC is addressed to basic questions about future developments in medical education and the role that the AAMC should play in these developments. It is an excellent report that provides much needed perspective to the current scene in medical education, especially to some of its major concerns. Of particular interest to persons in education would be the sections on the renaissance in medical education, the continuing advances and changes in medical education including those following World War II, and the current scene. The extended discussion of the trends related to health care and their implications for medical education will interest persons in education for the professions.

IV. Student Characteristics

10. Heist, Paul A., "The Student." In N. B. Henry, ed., Education for the Professions. 61st Yearbook of the National Society for the Study of Education. Chicago, University of Chicago Press, 1962.

Heist reviews studies describing characteristics of students in four professions; medicine, dentistry, law, and engineering. It is a comprehensive review of the literature, including Heist's own studies, and concludes with a carefully prepared series of hypotheses.

11. Becker, H. S., B. Geer, E. Hughes, and A. Strauss, Boys in White: Student Culture in Medical School. Chicago, University of Chicago Press, 1961.

This is a study conducted by sociologists of medical students at the University of Kansas Medical School. Based primarily on detailed accounts by participant observers, the book is a major report in medical education describing the characteristics of the culture of a medical school, the processes of adaptation within this culture, and the variations in students' responses from year to year toward medical education and medicine.

12. Merton, R. K., G. G. Reader, and P. L. Kendall, eds., The Student-Physician: Introductory Studies in the Sociology of Medical Education. Cambridge, Mass., Harvard University Press, 1957.

This is a combined effort of sociologists and medical educators, presenting some of the earliest reports of the Columbia University Bureau of Applied Social Research of studies in medical education. Selected data based on panel questionnaire methods and field observations at three medical schools (Cornell, Pennsylvania and Western Reserve) are presented and discussed. The book illustrates some of the benefits of collaboration between sociologist and medical educator and the advantages in comparing results obtained at several schools. The research reports are preceded by an excellent essay by Merton describing the meaning and development of the sociology of medical education (p. 3-79).

V. The Teaching-Learning Process

13. Miller, G., S. Abrahamson, I. Cohen, H. Graser, R. Harnack, and A. Land, Teaching and Learning in Medical School. Cambridge, Mass., Harvard University Press, 1961.

Designed for medical educators, this book examines the processes of teaching and learning in terms of basic theory and in the context of medical education. It begins with an examination of the characteristics of the medical student, moves on to the processes of learning focusing on both the student and the teacher, and then explores in detail the mechanisms and techniques of teaching. There is a careful analysis of the nature of evaluation and the techniques for measuring change in knowledge, performance, and attitudes. This informative reference work has helped medical teachers understand the nature of teaching, learning, and evaluation.

14. Horowitz, M. J., Educating Tomorrow's Doctors. New York, Appleton-Century-Crofts, 1964.

This book reports the case histories of 20 medical students in the experimental program introduced at Western Reserve University. The students were observed in medical school and their careers followed for five years after graduation. The nature of learning, individual differences in learning styles, adaptation, and professional development are the principal emphases of the book.

15. ______________, "Learning Styles and Learning Outcomes in Medical Students." The School Review, vol. 74. Spring, 1966.

Based on the case studies reported in the book by Horowitz, several learning styles and adaptive patterns in medical students are considered in relation to learning outcomes. Students' accounts of personal change are chosen for emphasis in descriptions of learning outcomes.

VI. Follow-up Studies and Career Studies, Graduate and Continuing Education

16. Dryer, B. V., "Lifetime Learning for Physicians: A Report from the Joint Study Committee in Continuing Education." Journal of Medical Education, vol. 37, No. 6. 1962.

This monograph published under the auspices of the Association of American Medical Colleges is a challenging presentation concerning the need for continuing education of the physician.

17. Kendall, P. L., *The Relationship Between Medical Educators and Medical Practitioners: Sources of Strain and Occasions for Cooperation*. Evanston, Ill., Association of American Medical Colleges, 1965.

This is a report of a study conducted in seven communities of the relationships between those who teach in medical schools and the physicians who practice in the communities in which the schools are located. The study was supported by the Association of American Medical Colleges to provide background data for the 1962 Institute on the Medical School and the Practicing Professions. It is significant as a document describing the dynamics of the relationships among medical teachers and practitioners--thereby identifying the emerging environment within which medical education must function.

18. Peterson, O. L., L. P. Andrews, R. S. Spain, and B. G. Greenberg, "An Analytical Study of North Carolina General Practice." *Journal of Medical Education*, vol. 31, Pt. II, 1956.

This unique study of physicians is a systematic attempt to evaluate the performance of practicing physicians, to establish criteria for evaluating their adequacy and to relate these criteria to other variables such as medical school performance. Each of ninety-four practitioners was observed for about three-and-a-half days, then rated in his effort to arrive at a diagnosis and his management of the problem. Much effort was given to methods of evaluating performance. The investigators found that rank in medical school was not related to adequacy of practice, nor were they able to detect any relationship between performance and quality of internship or the medical school attended.

19. *The Graduate Education of Physicians*. The Report of the Citizens Commission on Graduate Medical Education, Council on Medical Education, American Medical Association, 1966.

This report examines current problems and practices in the graduate education of physicians and makes a number of recommendations for changing existing programs. Concise and lucid (112 pages, paperback), the report is likely to influence significantly the directions of future educational programs for physicians.

20. Webster, T. G., *Career Decisions and Professional Self-Image of Medical Students* (working paper). For Preparatory Commission II, Conference on Psychiatry and Medical Education.

An up-to-date, comprehensive analysis of the literature on research and other reports related to career decisions in medical students supported by a highly useful bibliography.

VII. Dental Education

21. American Association of Dental Schools, Report of Research Projects in Dental Education. 1965-66.

This report, prepared by the Division of Educational Research of the American Association of Dental Schools (Spring, 1966) is a survey of current research projects in dental education. The individual projects are listed by title, purpose, method, evaluation, date initiated and date completed, and followed by a listing of the principal investigators. This report is an updating of the 1964-65 report.

22. American Council on Education, Dentistry in the U. S.: Status, Needs and Recommendation. Washington, D. C., 1960.

This report summarizes a survey conducted by the Commission on Survey of Dentistry in the U. S. The following topics were considered: dental health, dental practice, dental education and dental research. Concerning dental education, recommendations include: increasing the number of schools, increasing the quality of students admitted, attracting larger numbers of students to the field, improving the content and correlation of courses, making curriculums more flexible, stimulating and developing programs for the counseling of students and evaluating the effectiveness of teaching.

23. New York State Committee on Medical Education. Education for the Health Professions. Albany, New York, 1963.

This plan for comprehensive care to meet New York's needs consists of analyses of several health professions (medicine, dentistry, nursing, social work) and recommendations for means of meeting needs for education and research.

REACTIONS

In order for this second series of "New Dimensions in Higher Education" to better serve the needs of colleges and universities throughout the nation, reader reaction is herewith being sought. In this instance, with respect to Research in Professional Education, the following questions are asked:

1. Can you suggest other completed research, the results of which would add significantly to this report?
2. What problems related to this subject should be given the highest priority in terms of further research?
3. What has your institution done, or what does it propose to do, to investigate further either the curriculum or the methods of teaching in professional education?
4. What suggestions do you have for individual institutions, faculty members, or the United States Office of Education that would improve the quality of professional education?

Kindly address reactions to:

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